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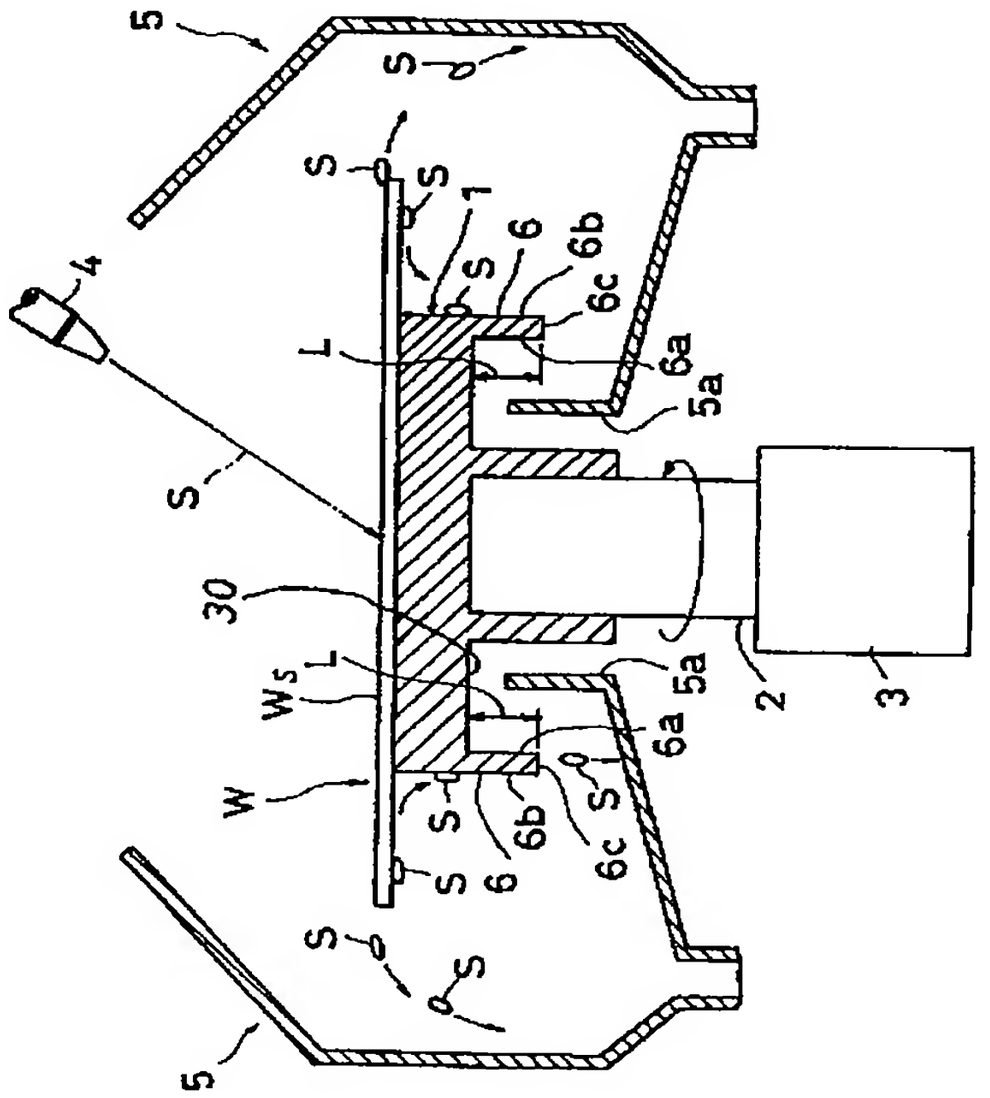
(54)【発明の名称】基板処理装置

(57)【要約】
【課題】　基板を回転させる回転駆動手段への処理液の侵入を阻止する基板処理装置を提供する。
【解決手段】　基板処理装置において、スピンチャック１の下面３０に垂れ下がり縁６が、飛散防止カップ５の内筒部５ａよりも外側に配設されており、内筒部５ａの上縁よりも下側にまで延在している。スピンチャック１の下面３０に沿って流れてきた処理液Ｓは縁６の下縁６ｃで落下して、そのまま飛散防止カップ５の内面に沿って排出される。その結果、回転軸２や電動モータ３への処理液Ｓの侵入を阻止することができて、処理液Ｓによる回転軸２や電動モータ３への損傷を未然に防止することができる。



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【特許請求の範囲】

【請求項１】　基板を水平姿勢に保持する基板保持手段と、前記基板保持手段を回転させることによって基板を水平面内に回転させる回転駆動手段とを備え、基板の処理面に処理液を供給することによって基板処理を行う基板処理装置であって、

前記回転駆動手段への処理液の侵入を阻止する侵入阻止構造を前記基板保持手段に配設したことを特徴とする基板処理装置。

【請求項２】　請求項１に記載の基板処理装置において、

前記侵入阻止構造は、前記基板保持手段の下面において、基板保持手段の下面の全周にわたって内周部側が高くなる高低差が設けられている構造であることを特徴とする基板処理装置。

【請求項３】　請求項１に記載の基板処理装置において、

前記侵入阻止構造は、前記基板保持手段側の下面に備えられた第１シール部と、この第１シール部の下面に対向して設けられた第２シール部とによって構成されるラビリンス構造であることを特徴とする基板処理装置。

【請求項４】　請求項３に記載の基板処理装置において、

前記ラビリンス構造は、少なくとも前記第１シール部と第２シール部との最外周にあるすきまが、毛細管現象による前記処理液の流入を回避可能な大きさであることを特徴とする基板処理装置。

【請求項５】　請求項１に記載の基板処理装置において、

前記基板保持手段は、吸引用の配管を介して吸引源に連通接続された吸引孔を基板保持手段の上面に有し、基板を吸着保持する吸着保持手段であって、

前記侵入阻止構造は、前記吸着保持手段の上面において前記吸引孔の外周に環状に配設され、上端の開口部が前記吸着保持手段の上面に吸着保持された基板の被吸着面によって閉塞される侵入阻止溝を備えたことを特徴とする基板処理装置。

【請求項６】　請求項５に記載の基板処理装置において、

前記侵入阻止溝の外周縁は、基板の被吸着面と線接触する環状の突起形状であることを特徴とする基板処理装置。

【請求項７】　請求項５または請求項６に記載の基板処理装置において、

前記基板保持手段は、前記侵入阻止溝を前記基板保持手段の外側雰囲気に連通させる貫通孔を備えていることを特徴とする基板処理装置。

【請求項８】　請求項１から請求項７のいずれかに記載の基板処理装置において、

前記侵入阻止構造はさらに、前記基板保持手段の回転中心部から外周部に向かって気体を送り込む経路を備えていることを特徴とする基板処理装置。

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【請求項９】　請求項８に記載の基板処理装置において、

前記気体は、不活性ガスであることを特徴とする基板処理装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、半導体基板、液晶表示器のガラス基板、フォトマスク用のガラス基板、光ディスク用の基板等（以下、単に基板と称する）に対して処理液を供給して基板処理を行う基板処理装置に係り、特に基板を回転させながら基板処理を行う回転式基板処理装置に関する。

【０００２】

【従来の技術】従来の回転式基板処理装置として、図７に示すような基板処理装置が知られている。基板Ｗを水平姿勢に吸着保持する円板状のバキューム式スピンチャック１０１は、その底面に連結された回転軸１０２を介して電動モータ１０３で回転駆動されるようになっている。この回転駆動により、スピンチャック１０１に保持された基板Ｗが回転中心Ｐ周りに水平面内で回転される。基板Ｗの上方には、処理液Ｓ（例えば洗浄液Ｓ）を基板Ｗの処理面Ｗｓに向けて供給するためのノズル１０４が配設されている。また、スピンチャック１０１の周囲には、上述した処理液Ｓが飛散するのを防止する飛散防止カップ１０５が配設されている。

【０００３】上述の構成を備えることによって、処理液Ｓは基板Ｗの処理面Ｗｓに供給されるのに伴って、基板Ｗの処理面Ｗｓに対してそれぞれの処理（上述の場合には洗浄処理）が行われる。また、基板Ｗの外周部から飛散した処理液Ｓは、飛散防止カップ１０５の内面に沿って排出される。従って、処理液Ｓは飛散防止カップ１０５よりも外側に飛散することはなく、処理液Ｓの飛散による汚染を防止することができる。

【０００４】

【発明が解決しようとする課題】しかしながら、上述のような構成を有する従来の基板処理装置の場合には、次のような問題点がある。即ち、基板Ｗを回転させる回転軸１０２や電動モータ１０３といった回転駆動部にまでに処理液Ｓが回り込んで、回転駆動部に損傷を与える点である。

【０００５】基板Ｗが高速で回転する場合においては、基板Ｗに遠心力がかかるので、基板Ｗに供給された処理液Ｓは外部に飛散されて、飛散防止カップ１０５の内面に沿って排出される。従って、基板Ｗの回転中心部に処理液Ｓが回り込んで、回転軸１０２や電動モータ１０３といった回転駆動部にまでに処理液Ｓが及ぶことは少ない。

【０００６】しかしながら、基板Ｗを停止した状態で処

理液Ｓを供給したり、基板Ｗを低速で回転させる場合においては、基板Ｗに遠心力がかからない。従って、基板Ｗの表面状態や処理液Ｓの特性によっては、基板Ｗに供給された処理液Ｓは基板Ｗの裏面やスピンチャック１０１の裏面（即ち下面）にまで回り込む。処理液Ｓの回り込みによって、回転軸１０２にまで処理液Ｓが及び、回転駆動部に損傷を与えることになる。

【０００７】また、基板Ｗが高速で回転する場合においても、基板Ｗを停止する際に処理液Ｓのミストを含む雰囲気（ガス）が回転中心部に引き込まれて、回転駆動部に損傷を与えてしまう。

【０００８】これまでは、飛散する処理液Ｓを少しでも抑えれるように飛散防止カップ１０５を改良したりというように、外部に飛散する処理液Ｓについて着目されてきた。今回、本発明者等は回転駆動部にまで損傷を及ぼす処理液Ｓの侵入防止について着目した。

【０００９】本発明は、このような事情に鑑みてなされたものであって、基板を回転させる回転駆動手段への処理液の侵入を阻止する基板処理装置を提供することを課題とする。

【００１０】

【課題を解決するための手段】本発明は、上記課題を達成するために、次のような構成をとる。即ち、請求項１に記載の発明は、基板を水平姿勢に保持する基板保持手段と、前記基板保持手段を回転させることによって基板を水平面内に回転させる回転駆動手段とを備え、基板の処理面に処理液を供給することによって基板処理を行う基板処理装置であって、前記回転駆動手段への処理液の侵入を阻止する侵入阻止構造を前記基板保持手段に配設したことを特徴とする。

【００１１】また、請求項２に記載の発明は、請求項１に記載の基板処理装置において、前記侵入阻止構造は、前記基板保持手段の下面において、基板保持手段の下面の全周にわたって内周部側が高くなる高低差が設けられている構造であることを特徴とする。

【００１２】また、請求項３に記載の発明は、請求項１に記載の基板処理装置において、前記侵入阻止構造は、前記基板保持手段側の下面に備えられた第１シール部と、この第１シール部の下面に対向して設けられた第２シール部とによって構成されるラビリンス構造であることを特徴とする。

【００１３】また、請求項４に記載の発明は、請求項３に記載の基板処理装置において、前記ラビリンス構造は、少なくとも前記第１シール部と第２シール部との最外周にあるすきまが、毛細管現象による前記処理液の流入を回避可能な大きさであることを特徴とする。

【００１４】また、請求項５に記載の発明は、請求項１に記載の基板処理装置において、前記基板保持手段は、吸引用の配管を介して吸引源に連通接続された吸引孔を基板保持手段の上面に有し、基板を吸着保持する吸着保持手段であって、前記侵入阻止構造は、前記吸着保持手段の上面において前記吸引孔の外周に環状に配設され、上端の開口部が前記吸着保持手段の上面に吸着保持された基板の被吸着面によって閉塞される侵入阻止溝を備えたことを特徴とする。

【００１５】また、請求項６に記載の発明は、請求項５に記載の基板処理装置において、前記侵入阻止溝の外周縁は、基板の被吸着面と線接触する環状の突起形状であることを特徴とする。

【００１６】また、請求項７に記載の発明は、請求項５または請求項６に記載の基板処理装置において、前記基板保持手段は、前記侵入阻止溝を前記基板保持手段の外側雰囲気に連通させる貫通孔を備えていることを特徴とする。

【００１７】また、請求項８に記載の発明は、請求項１から請求項７のいずれかに記載の基板処理装置において、前記侵入阻止構造はさらに、前記基板保持手段の回転中心部から外周部に向かって気体を送り込む経路を備えていることを特徴とする。

【００１８】また、請求項９に記載の発明は、請求項８に記載の基板処理装置において、前記気体は、不活性ガスであることを特徴とする。

【００１９】

【作用】請求項１に記載の発明の作用について説明する。回転駆動手段は基板保持手段と、これに水平姿勢に保持された基板とを回転させる。基板の回転状態または停止状態において、処理液は基板の処理面に供給される。また、回転駆動手段への処理液の侵入を阻止する侵入阻止構造を基板保持手段に配設することによって、基板の処理面に供給された処理液が回転駆動手段に侵入することなく、基板の処理が行われることになる。

【００２０】請求項２に記載の発明によれば、基板保持手段の下面の全周にわたって内周部側が高くなる高低差が設けられているので、基板の裏面を沿って基板保持手段の下面に回り込んだ処理液が基板保持手段の内周部側、即ち回転軸側に向かって流れることなく、重力に従って下方に落下する。従って、回転中心部にまで処理液が及ぶことなく、その結果、処理液は回転駆動手段に侵入することはない。

【００２１】請求項３に記載の発明によれば、侵入阻止構造はラビリンス構造であるので、基板保持手段の下面に回り込んだ処理液の回転駆動手段への侵入がラビリンス構造によって阻止されることになる。

【００２２】請求項４に記載の発明によれば、ラビリンス構造は第１シール部と第２シール部との最外周にあるすきまが毛細管現象による処理液の流入を回避可能な大きさであるので、処理液が最外周にあるすきまに侵入しても、狭いすきまを通って処理液が浸透する毛細管現象の発生が確実に防止される。従って、回転駆動手段への処理液の侵入がより一層阻止されることになる。

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【００２３】請求項５に記載の発明によれば、吸着保持手段の上面において吸引孔の外周に環状に配設され、上端の開口部が吸着保持手段の上面に吸着保持された基板の被吸着面によって閉塞される侵入阻止溝を備えているので、基板の裏面に沿って処理液が侵入阻止溝に侵入しても、侵入阻止溝内の回転中心側の壁部に遮られて、処理液が吸引孔を介して吸着保持手段内に浸透することはない。その結果、処理液は回転駆動手段に侵入することはない。

【００２４】請求項６に記載の発明によれば、侵入阻止溝の外周縁は基板の被吸着面と線接触する環状の突起形状であるので、基板の被吸着面に沿って流れてきた処理液が、基板の被吸着面と環状の突起形状である侵入阻止溝の外周縁とのすきまを浸透する毛細管現象が発生し難くなる。従って、処理液は侵入阻止溝に侵入し難くなり、回転駆動手段への処理液の侵入がより一層阻止されることになる。

【００２５】請求項７に記載の発明によれば、基板保持手段は、侵入阻止溝を基板保持手段の外側雰囲気に連通させる貫通孔を備えているので、基板保持手段の側方の圧力と侵入阻止溝内の圧力とが同じになる。従って、吸引孔を介して基板を吸引吸着する際における回転中心部に引き込まれるような負圧が侵入阻止溝内にかからないので、侵入阻止溝内の処理液が回転中心部側に向かって侵入し難くなる。従って、回転駆動手段への処理液の侵入がより一層阻止されることになる。

【００２６】請求項８に記載の発明によれば、基板保持手段の回転中心部から外周部に向かって気体を送り込む経路を基板保持手段に備えているので、処理液が回転中心部に向かって侵入してきても、気体によって遮られて、回転中心部にまで処理液が及ぶことはない。その結果、処理液は回転駆動手段に侵入することはない。

【００２７】請求項９に記載の発明によれば、基板保持手段の回転中心部から外周部に向かって送り込まれる気体が不活性ガスなので、送り込まれた気体によって処理液や基板が悪影響を受けることはない。

【００２８】

【発明の実施の形態】〔第１実施例〕以下、図面を参照して本発明の第１実施例を説明する。また実施例（第２実施例以降も含む）では、洗浄液を基板に供給して基板処理を行う基板処理（基板洗浄）装置を例に採って説明するが、フォトレジスト液や現像液等に例示されるように、基板の処理に通常用いられる処理液ならば、特に限定されない。図１は、第１実施例装置の構成を示す概略断面図である。

【００２９】基板処理装置は、図１に示すように、基板Ｗを水平姿勢に保持する円板状のバキューム式スピンチャック１と、このスピンチャック１の底面に連結された回転軸２と、この回転軸２を軸心回りに回転させる電動モータ３と、洗浄液Ｓを基板Ｗの処理面Ｗｓに向けて供給するために基板Ｗの上方に配設されているノズル４と、処理液Ｓが飛散するのを防止するためにスピンチャック１の周囲に配設されている飛散防止カップ５とを備えている。電動モータ３によって回転軸２が軸心回りに回転するのに伴って、スピンチャック１と、このスピンチャック１に水平姿勢に保持されている基板Ｗとが水平面内で回転される。スピンチャック１は上述のようなバキューム式以外にも、基板Ｗを水平姿勢に保持する支持ピンを複数箇所に立設したスピンチャックに例示されるように、基板Ｗを水平姿勢に保持する基板保持手段の機能を備える構成であれば特に限定されない。スピンチャック１は、本発明における基板保持手段に相当し、回転軸２と電動モータ３とは、本発明における回転駆動手段に相当する。

【００３０】また、スピンチャック１の下面３０に沿って流れてきた処理液Ｓが回転軸２や電動モータ３へ侵入するのを阻止するために、スピンチャック１の下面３０には、図１に示すように、長さＬの環状の垂れ下がり縁６が配設されている。この縁６は、飛散防止カップ５の内筒部５ａよりも外側に配設されており、内筒部５ａの上縁よりも下側にまで延在している。即ち、縁６の下縁６ｃは飛散防止カップ５の内筒部５ａの上縁よりも下側にある。また、縁６の長さＬが１ｍｍ未満では上記処理液Ｓが縁６を超えて回転中心部にまで侵入する恐れがあるので、縁６の長さＬは１ｍｍ以上が好ましい。縁６は、本発明における侵入阻止構造に相当し、縁６の下縁６ｃとスピンチャック１の下面３０との高低差が、本発明における「基板保持手段の下面の全周にわたって内周部側が高くなる高低差」に相当する。

【００３１】上述の構成を備えた第１実施例装置は以下の作用を奏する。即ち、遠心力によって基板Ｗの外周部から飛散した処理液Ｓは、飛散防止カップ５の内面に沿って排出される。基板Ｗの裏面に回り込み、さらにスピンチャック１の外周縁にまで達した処理液Ｓは、縁６の外側面６ｂに沿って流下する。縁６の下縁６ｃまで流れると、処理液Ｓは縁６から離れてそのまま落下するか、縁６の下縁６ｃに沿って下縁６ｃと内側面６ａとの境界部分まで流れる。内側面６ａは、図１に示すように垂直面であるので、下縁６ｃと内側面６ａとの境界部分まで流れてきた処理液Ｓは内側面６ａに沿って流れることはなく、境界部分で留まった後落下する。縁６が飛散防止カップ５の内筒部５ａよりも外側に配設されているので、基板Ｗの外周部から飛散した処理液Ｓと同様に、縁６によって落下した処理液Ｓはそのまま飛散防止カップ５の内面に沿って排出される。つまり、スピンチャック１の下面３０の全周にわたって内周部側が高くなる高低差が設けられているので、基板Ｗの裏面に沿ってスピンチャック１の下面３０に回り込んだ処理液Ｓがスピンチャック１の内周部側、即ち回転軸２側に向かって流れることはなく重力に従って下方に落下する。

【００３２】上述の作用によって、スピンチャック１の下面３０にまで回り込んだ処理液Ｓは回転中心部にまで及ばない。従って、回転軸２や電動モータ３への処理液Ｓの侵入を阻止することができる。たとえ基板Ｗを停止した状態で処理液Ｓを供給したり、基板Ｗを低速で回転させる場合でも、スピンチャック１の下面３０にまで回り込んだ処理液Ｓの侵入を阻止することができ、また基板Ｗが停止して処理液Ｓが回転中心部に引き込まれる場合でも、処理液Ｓの侵入を阻止することができる。以上より、回転軸２や電動モータ３といった回転駆動部（以下、回転軸２や電動モータ３をまとめて「回転駆動部」とする）に損傷を与えることはない。

【００３３】なお、第１実施例装置は、図２に示すように、変形実施することができる。上述の第１実施例装置では、縁６は飛散防止カップ５の内筒部５ａの上縁よりも下側にまで延在していたが、上述の処理液Ｓはいずれの場合でも縁６の下縁６ｃで落下するので、図２（ａ）に示すように、縁６の下縁６ｃは飛散防止カップ５の内筒部５ａの上縁よりも上側であってもよい。ただし、下縁６ｃで落下した処理液Ｓが負圧等によって回転中心部に引き込まれて、飛散防止カップ５の内筒部５ａよりも内側に落下して、回転軸２や電動モータ３等を損傷する恐れがあるので、縁６は図２（ａ）に示すような構成よりも、図１に示すような構成の方がより好ましい。

【００３４】また、上述の第１実施例装置では、縁６の内側面６ａは垂直面であったが、基板Ｗを水平姿勢に保持するスピンチャック１に代表されるような基板保持手段の下面に基板保持手段の下面の全周にわたって内周部側が高くなる高低差を有する構成であるならば、例えば図２（ｂ）に示すような斜面であってもよい。

【００３５】また、縁６は必ずしもスピンチャック１の外周側の端縁に配設する必要はなく、例えば図２（ｃ）に示すように、スピンチャック１の下面３０の回転中心側寄りに配設する等、縁６の配設箇所については特に限定されない。ただし、回転駆動部への侵入を阻止する点から、第１実施例装置のような飛散防止カップ５を備える場合には、飛散防止カップ５の内筒部５ａよりも外側に縁６が配設されている方が好ましく、また飛散防止カップ５の内筒部５ａの外側面と縁６の内側面６ａとは毛細管現象による処理液の流入が回避できる間隔に配置するのが好ましい。

【００３６】また、図２（ｄ）に示すように、スピンチャック１の下面３０に溝７を環状に配設してもよい。この場合、溝７が基板保持手段としてのスピンチャック１の下面３０の全周にわたって内周部側が高くなる高低差を形成することになるので、上述したような作用・効果が得られる。なお、図２（ｄ）において溝７は断面形状が半円形としたが、溝７の形状は特に限定されず、スピンチャック１の下面３０に環状に配設された溝であればよい。

【００３７】以上より、基板Ｗを水平姿勢に保持するスピンチャック１に代表されるような基板保持手段の下面に基板保持手段の下面の全周にわたって内周部側が高くなる高低差を備えた構成であるならば、第１実施例装置の構成は特に限定されない。

【００３８】〔第２実施例〕次に第２実施例について図面を参照しながら説明する。図３（ａ）は、第２実施例装置の特徴部分の構成を示す概略断面図であり、図３（ｂ）、（ｃ）は第２実施例に関する変形例を示す各概略断面図である。なお、第１実施例装置と共通する箇所については同符号を付して、その箇所の図示及び説明を省略する。

【００３９】第２実施例装置は、第１実施例装置と同様に、スピンチャック１と回転軸２と電動モータ３とノズル４と飛散防止カップ５とを備えている。第２実施例装置の特徴部分について説明すると、図３（ａ）に示すように、スピンチャック１の下面には複数個の同心円状の垂れ下がり縁である第１シール部１ａが配設されている。第１シール部１ａの下面に対向する飛散防止カップ５の内筒部５ａには複数個の同心円状の立ち上がり縁である第２シール部５ｂが配設されている。そして、スピンチャック１の第１シール部１ａと内筒部５ａの第２シール部５ｂとの間にすきま８がそれぞれ形成されるように、これらの縁は互い違いに嵌め合わされている。つまり、第１シール部１ａと第２シール部５ｂとはラビリンス（labyrinth）構造のシールを構成している。第１シール部１ａと第２シール部５ｂとによって構成されるラビリンス構造は、本発明における侵入阻止構造に相当する。

【００４０】さらに、内筒部５ａには、窒素ガス（N_2）のような不活性ガスを図３（ａ）中の矢印の方向（即ち、回転中心部から外周部に向う方向）に送り込む供給経路９が配設されている。この供給経路９の回転中心側（内側）と、N_2 のような不活性ガスを供給するガス供給源１０とが、図示を省略するレギュレータ等を介して連通されている。また、図３（ａ）に示すように、供給経路９は複数本に分岐してすきま８に連通されている。また、最外周にあるすきま８の幅D_1は、毛細管現象による処理液の流入を回避可能な大きさに形成されている。このすきま８の幅D_1は、例えば５ｍｍに設定される。このすきま８と供給経路９とは、本発明における「基板保持手段の回転中心部から外周部に向かって気体を送り込む経路」に相当する。

【００４１】上述の構成を備えた第２実施例装置は以下の作用を奏する。即ち、ノズル４から処理液Ｓを基板Ｗの処理面Ｗｓに供給する前に、不活性ガスをガス供給源１０から供給経路９に図３（ａ）中の矢印の方向に向かって予め送り込む。供給経路９に送り込まれたガスは、すきま８に充填される。ガスが充填された後に、ノズル４から処理液Ｓの供給を開始する。

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【００４２】第１実施例と同様に、遠心力によって基板Wの外周部から飛散した処理液Ｓは、飛散防止カップ５の内面に沿って排出される。基板Wの裏面に回り込み、さらにスピンチャック１の下面にまで回り込んだ処理液Ｓは、第１シール部１ａと第２シール部５ｂとによって構成されたラビリンス構造によって、回転駆動部へ侵入することなく阻止される。

【００４３】また、負圧等によって処理液Ｓが最外周にあるすきま８に引き込まれても、最外周にあるすきま８の幅D_1が毛細管現象による処理液の流入を回避可能な大きさであるので、狭いすきまを通って処理液が浸透する毛細管現象の発生を確実に防止することができる。従って、回転駆動部への処理液Ｓの侵入をより阻止することができる。

【００４４】また、不活性ガスが図３（ａ）中の矢印の方向に向かって送り込まれるとともに、すきま８内に充填されているので、処理液Ｓや、処理液Ｓのミストを含む雰囲気（ガス）が回転中心部に向かって仮に侵入してきても、不活性ガスによって遮られて、回転中心部にまで及ぶことはない。また、すきま８内に供給される気体が不活性ガスなので、処理液Ｓや基板Wに悪影響を与えることはない。

【００４５】なお、第２実施例装置は、図３（ｂ）及び（ｃ）に示すように、変形実施することができる。上述の第２実施例装置では、供給経路９を介してガス供給源１０からすきま８に不活性ガスを送り込んでいたが、図３（ｂ）に示すように、ガス供給源１０からすきま８に不活性ガスを直接的に送り込むような構成であってもよい。なお、最も内側にあるすきま８には不活性ガスが回転中心側に送り込まれるのを防止するために回転シール１１が配設されている。上述の第２実施例装置では、すきま８に供給された不活性ガスの一部が回転中心側に漏れることもあるが、図３（ｂ）に示すような構成を備えることによって、不活性ガスはすきま８内を回転中心側から外周側に向かって流れるので、処理液Ｓの侵入をより一層阻止することができる。

【００４６】また、上述の第２実施例装置では、最外周側にあるすきま８の幅D_1は毛細管現象による処理液の流入を回避可能な大きさとしたが、すきま８のサイズについては特に限定されず、例えば図３（ｃ）に示すように最外周側にあるすきま８の幅D_1が内側のすきまの幅D_2と同じサイズであってもよいし、最外周にあるすきま８の幅D_1が毛細管現象による処理液の流入を回避可能な大きさでなくてもよい。ただし、最外周側から回転中心側に処理液が浸透する毛細管現象を発生し難くする点において、最外周側にあるすきま８の幅D_1を毛細管現象による処理液の流入を回避可能な大きさとするのがより好ましい。

【００４７】また、上述の第２実施例装置では、不活性ガスをすきま８に供給していたが、必ずしも不活性ガス

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等を送り込まなくてもよく、図３（ｃ）に示すようなラビリンス構造のみの構成でもよい。ただし、不活性ガスで遮ることによって、処理液Ｓや、処理液Ｓのミストを含む雰囲気（ガス）の侵入がより阻止される点において、図３（ｃ）に示すような構成よりも、図３（ａ）に示すような構成の方がより好ましい。

【００４８】上述の第２実施例装置では、不活性ガスとしてN_2を例に挙げたが、ＡｒやＨｅ等に例示されるように、使用される不活性ガスの種類については特に限定されない。また、不活性ガス以外の気体をすきま８と供給経路９とに送り込んで充填させてもよく、空気等に例示されるように、使用される気体の種類については、処理液Ｓや基板Wに悪影響を与えなければ、特に限定されない。

【００４９】〔第３実施例〕次に第３実施例について図面を参照しながら説明する。図４は、第３実施例装置の特徴部分の構成を示す概略断面図である。なお、第１，第２実施例装置と共通する箇所については同符号を付して、その箇所の図示及び説明を省略する。また、第３実施例では、スピンチャック１は基板Wを吸着保持するバキューム式で構築されており、本発明における吸着保持手段に相当する。

【００５０】第３実施例装置は、第１，第２実施例装置と同様に、スピンチャック１と回転軸２と電動モータ３とノズル４と飛散防止カップ５とを備えている。バキューム式のスピンチャック１についてさらに詳しく述べると、基板Wを真空吸着して水平姿勢に保持するための吸引孔３１がスピンチャック１の上面に形成されており、吸引孔３１に連通接続されている真空用の配管１２がスピンチャック１内に配設されている。これらの配管１２はスピンチャック１の回転中心部において、１本の中空配管１２としてまとめられている。回転軸２と電動モータ３とは中空になっており、回転軸２と電動モータ３との各中空部１３は互いに連通されている。この中空部１３の一方は中空配管１２に連通しており、他方はバキュームシール１４を備えた真空配管１５を介して真空ポンプ１６に連通されている。真空用の配管１２、中空部１３、及び真空配管１５は、本発明における吸引用の配管に相当し、真空ポンプ１６は、本発明における吸引源に相当する。

【００５１】真空ポンプ１６を作動させると、真空圧によって、基板Wはスピンチャック１に水平姿勢に吸着保持される。第１，第２実施例では、処理液Ｓがスピンチャック１の下面にまで回り込んだ場合について説明したが、この真空圧によって回転中心部から外周部に負圧がかかって、処理液Ｓの一部は基板Wの裏面とスピンチャック１の上面とのすきまに侵入する。侵入した処理液Ｓは、この負圧によって吸引孔３１からスピンチャック１内に浸透して、さらには回転駆動部の中空部１３に侵入して、回転駆動部内部から損傷を与えてしまう。そこ

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で、基板Ｗの裏面に処理液Ｓが回り込んだ場合に回転駆動部内部への侵入を阻止するために、第３実施例装置では、以下の特徴部分を備えている。

【００５２】即ち、溝１７がスピンチャック１の上面外周部に環状に配設されている。この溝１７は、図４に示すように、最も外周部に配設されている吸引孔３１よりもさらに外周側に配設されている。そして図４に示すように、溝１７の上端の開口部はスピンチャック１に吸着保持された基板Ｗの被吸着面、即ち基板Ｗの裏面によって閉塞されている。また、溝１７の外周縁は、図４に示すように、基板Ｗの裏面と線接触する環状の突起形状の突起部１８を構成している。また、突起部１８にスピンチャック１の外側雰囲気に連通する貫通孔１９を配設することによって、スピンチャック１の外周雰囲気と溝１７とが連通されている。溝１７は、本発明における侵入阻止溝に相当し、貫通孔１９は本発明における貫通孔に相当し、溝１７と突起部１８と貫通孔１９とは本発明における侵入阻止構造に相当する。

【００５３】上述の構成を備えた第３実施例装置は以下の作用を奏する。即ち、真空ポンプ１６を作動させて基板Ｗが真空吸着された状態で、ノズル４から処理液Ｓの供給を開始すると、上述したように回転中心部から外周部に真空圧による負圧がかかり、処理液Ｓの一部が基板Ｗの裏面に回り込む。突起部１８は基板Ｗの裏面に線接触されているので、面接触されているときのような毛細管現象が発生し難くなる。従って、処理液Ｓは溝１７に侵入し難くなり、回転駆動部への侵入を阻止することができる。

【００５４】また、処理液Ｓが溝１７に侵入しても、溝１７内の回転中心側の壁部１７ａによって遮られるので、回転中心部側に向かって処理液Ｓが侵入し難くなり、その結果、処理液Ｓが吸引孔３１からスピンチャック１内に浸透して、さらには回転駆動部の中空部１３に侵入するのを阻止することができる。そのため、処理液が回転駆動部に侵入して回転駆動部内部を損傷することを防止することができる。さらに、貫通孔１９を配設することによって、スピンチャック１の外側雰囲気と溝１７とが連通されるので、溝１７内は大気圧になり、回転中心部から外周部に真空圧による負圧がかかっても溝１７内には及ばない。従って、処理液Ｓが溝１７に侵入しても、回転中心部側に向かって処理液Ｓがスピンチャック１内により浸透し難くなり、その結果、回転駆動部への侵入をより阻止することができる。

【００５５】なお、第３実施例装置は、図５に示すように、変形実施することができる。上述の第３実施例では、突起部１８に貫通孔１９を配設していたが、貫通孔１９は溝１７をスピンチャック１の外側雰囲気と連通させることさえすれば、スピンチャック１においてどの位置に設けられていてもよく、例えば溝１７の底面に設けられていてもよい。また、図５（ａ）に示すような貫通孔１９を配設しない構成であってもよい。ただし、貫通孔１９がないと溝１７内に侵入した処理液Ｓが真空圧による負圧によって回転中心部に引き込まれる恐れがあるので、図５（ａ）に示すような貫通孔１９を配設しない構成よりも、図４に示すような構成の方がより好ましい。

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【００５６】また、上述の第３実施例装置では、溝１７の外周縁は基板Ｗの裏面と線接触する環状の突起部１８を構成していたが、例えば図５（ｂ）に示すように、溝１７の外周縁は基板Ｗの裏面と面接触する環状の面を構成してもよい。ただし、面接触の場合には基板Ｗの裏面に流れ込んだ処理液Ｓが突起部１８内を浸透する毛細管現象が発生し易いので、図５（ｂ）に示すような構成よりも、図４に示すような構成の方がより好ましい。

【００５７】〔変形例〕本発明は、上記実施形態に限られることはなく、下記のように変形実施することができる。

【００５８】即ち、上述した第１，第２実施例装置では、スピンチャック１に代表されるような基板保持手段の下面に侵入阻止構造が配設されており、第３実施例装置では、基板保持手段の上面に侵入阻止構造が配設されている場合であったが、基板保持手段の上面または下面以外に侵入阻止構造を配設してもよい。例えば、図６に示すように、スピンチャック１の底部に突起部２０を配設するとともに、その突起部２０を飛散防止カップ５の内筒部５ａよりも外側に配設してもよい。スピンチャック１の下面に沿って回り込んできた処理液Ｓは、スピンチャック１の側面に沿って流れ込み、突起部２０に沿って飛散防止カップ５内に排出される。このように基板処理装置に回転駆動部への処理液の侵入を阻止する侵入阻止構造が配設されていれば、配設箇所や形状については特に限定されない。

【００５９】上述した各実施例や変形例を適宜組み合わせる変形例も考えられる。例えば、第２実施例で、気体をすきま８と供給経路９とに送り込む経路を配設したが、このような経路を第３実施例に組み合わせてもよい。つまり、すきま８または供給経路９を溝１７に連通接続させて、気体をすきま８または供給経路９を介して溝１７に送り込み、溝１７内に気体を充填させてもよい。

【００６０】

【発明の効果】以上に詳述したように、請求項１の発明に係る基板処理装置によれば、回転駆動手段への処理液の侵入を阻止する侵入阻止構造を基板保持手段に配設しているので、基板の処理面に供給された処理液が回転駆動手段に侵入することなく、基板の回転状態または停止状態において、基板処理を行うことができる。

【００６１】請求項２の発明に係る基板処理装置によれば、基板保持手段の下面の全周にわたって内周部側が高くなる高低差が設けられているので、回転中心部にまで

処理液が及ぶことなく、回転駆動手段への処理液の侵入を阻止することができる。

【００６２】請求項３の発明に係る基板処理装置によれば、侵入阻止構造はラビリンス構造であるので、基板保持手段の下面に回り込んだ処理液の回転駆動手段への侵入をラビリンス構造によって阻止することができる。

【００６３】請求項４の発明に係る基板処理装置によれば、ラビリンス構造は第１シール部と第２シール部との最外周にあるすきまが毛細管現象による処理液の流入を回避可能な大きさであるので、狭いすきまを通って処理液が浸透する毛細管現象の発生を確実に防止することができて、回転駆動手段への処理液の侵入をより一層阻止することができる。

【００６４】請求項５の発明に係る基板処理装置によれば、吸着保持手段の上面において吸引孔の外周に環状に配設され、上端の開口部が吸着保持手段の上面に吸着保持された基板の被吸着面によって閉塞される侵入阻止溝を備えているので、基板の裏面に沿って流れてきた処理液が吸引孔を介して吸着保持手段内に浸透することなく、回転駆動手段への処理液の侵入を阻止することができる。

【００６５】請求項６の発明に係る基板処理装置によれば、侵入阻止溝の外周縁は基板の被吸着面と線接触する環状の突起形状であるので、基板の被吸着面に沿って流れてきた処理液が、基板の被吸着面と環状の突起形状である侵入阻止溝の外周縁とのすきまを浸透する毛細管現象が発生し難くなり、回転駆動手段への処理液の侵入をより一層阻止することができる。

【００６６】請求項７の発明に係る基板処理装置によれば、基板保持手段は、侵入阻止溝を基板保持手段の外側雰囲気に連通させる貫通孔を備えているので、侵入阻止溝内の処理液が回転中心部側に向かって侵入し難くなり、回転駆動手段への処理液の侵入をより一層阻止することができる。

【００６７】請求項８の発明に係る基板処理装置によれば、基板保持手段の回転中心部から外周部に向かって気体を送り込む経路を基板保持手段に備えているので、回転中心部にまで処理液が及ぶことなく、回転駆動手段への処理液の侵入を阻止することができる。

【００６８】請求項９の発明に係る基板処理装置によれば、基板保持手段の回転中心部から外周部に向かって送

り込まれる気体が不活性ガスなので、処理液や基板に悪影響を与えることない。

【図面の簡単な説明】

【図１】第１実施例装置の構成を示す概略断面図である。

【図２】（ａ）～（ｄ）は第１実施例に関する変形例を示す各概略断面図である。

【図３】（ａ）は第２実施例装置の特徴部分の構成を示す概略断面図、（ｂ）及び（ｃ）は第２実施例に関する変形例を示す各概略断面図である。

【図４】第３実施例装置の特徴部分の構成を示す概略断面図である。

【図５】（ａ）及び（ｂ）は第３実施例に関する変形例を示す各概略断面図である。

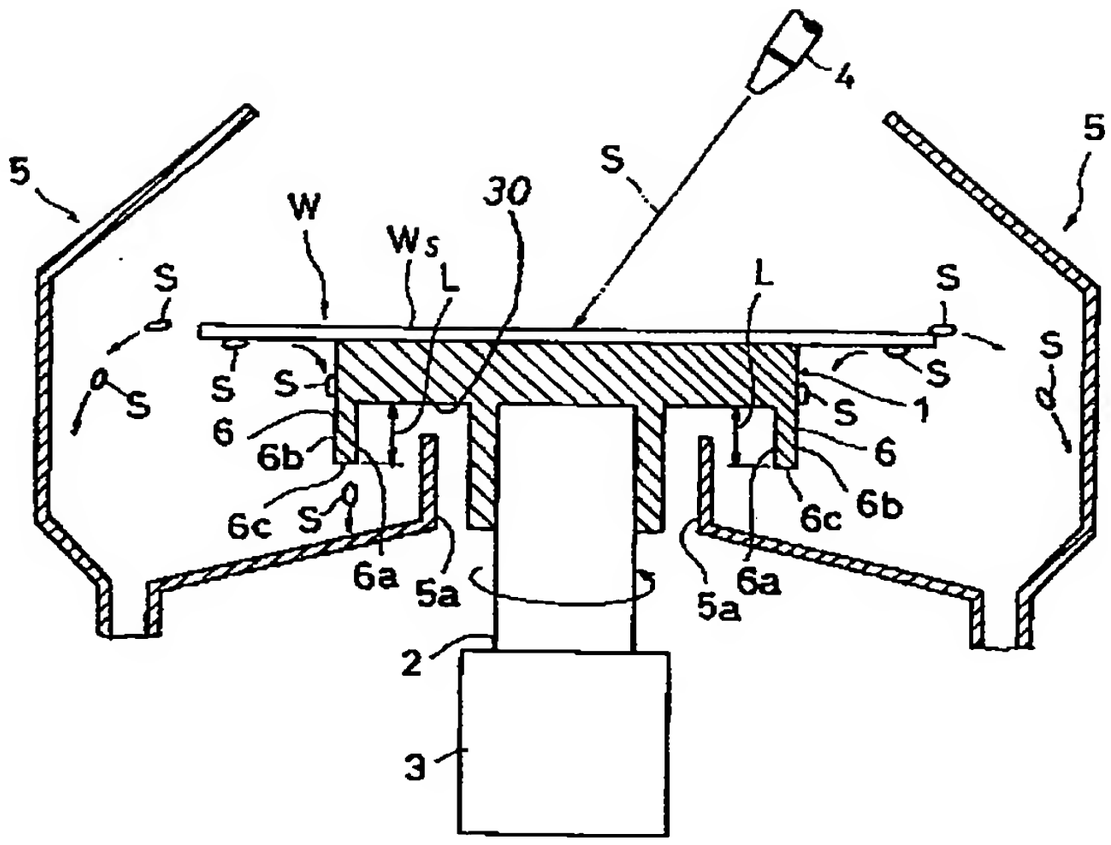
【図６】さらなる変形例に係る基板処理装置の各概略断面図である。

【図７】従来の基板処理装置の構成を示す概略断面図である。

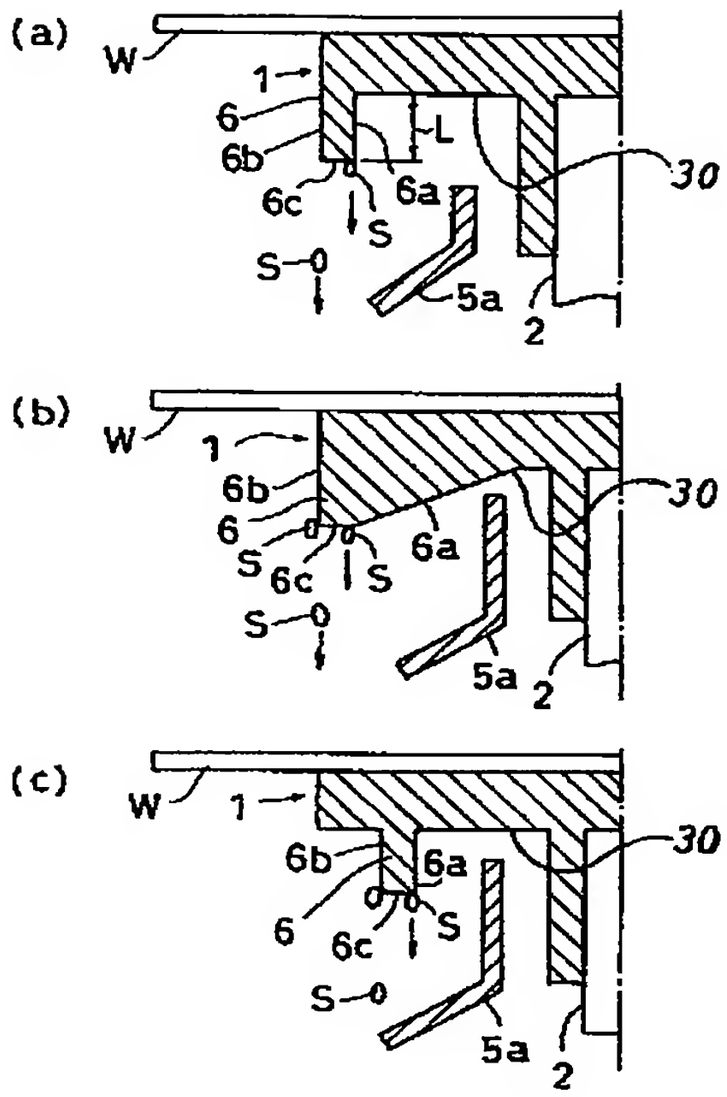
【符号の説明】

１　…　スピンチャック
１ａ　…　第１シール部
２　…　回転軸
３　…　電動モータ
５　…　飛散防止カップ
５ａ　…　内筒部
５ｂ　…　第２シール部
６　…　縁
８　…　すきま
９　…　供給経路
１０　…　ガス供給源
１２　…　配管
１３　…　中空部
１６　…　真空ポンプ
１７　…　溝
１８　…　突起部
１９　…　貫通孔
３０　…　下面
３１　…　吸着孔
Ｗ　…　基板
Ｗｓ　…　処理面
Ｓ　…　処理液

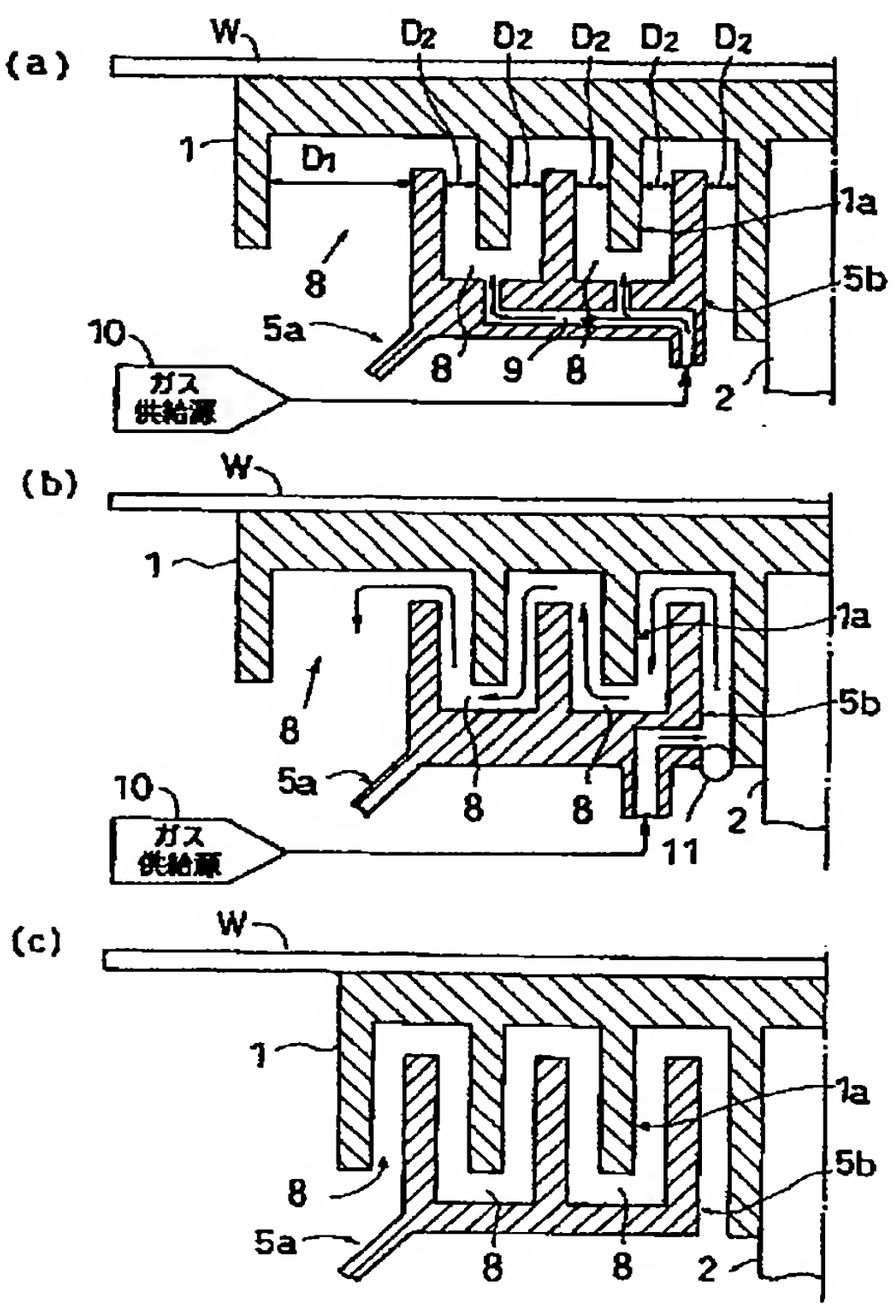
【図１】


4
5
5
S
W
Ws
30
L
L
S
S
S
S
S
S
S
S
S
S
1
6
6b
6c
6
6b
6c
6a
5a
6a
5a
2
3

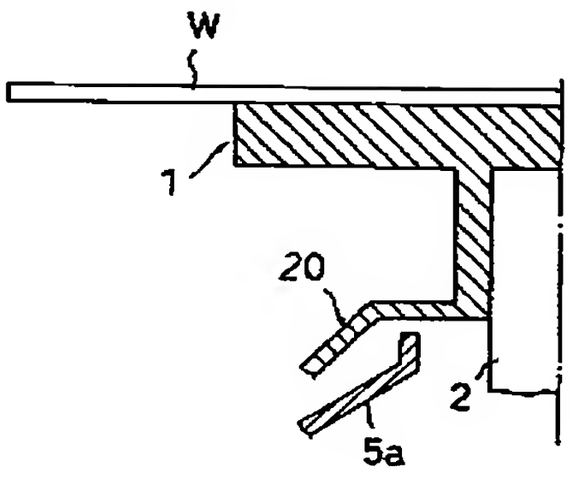
【図２】


(a)
W
1
6
6b
6c
S
S
6a
L
30
5a
2
(b)
W
1
6b
6
S
6c
S
S
6a
30
5a
2
(c)
W
1
6b
6
6c
S
S
6a
30
5a
2
(d)
W
1
S
7
30
5a
2

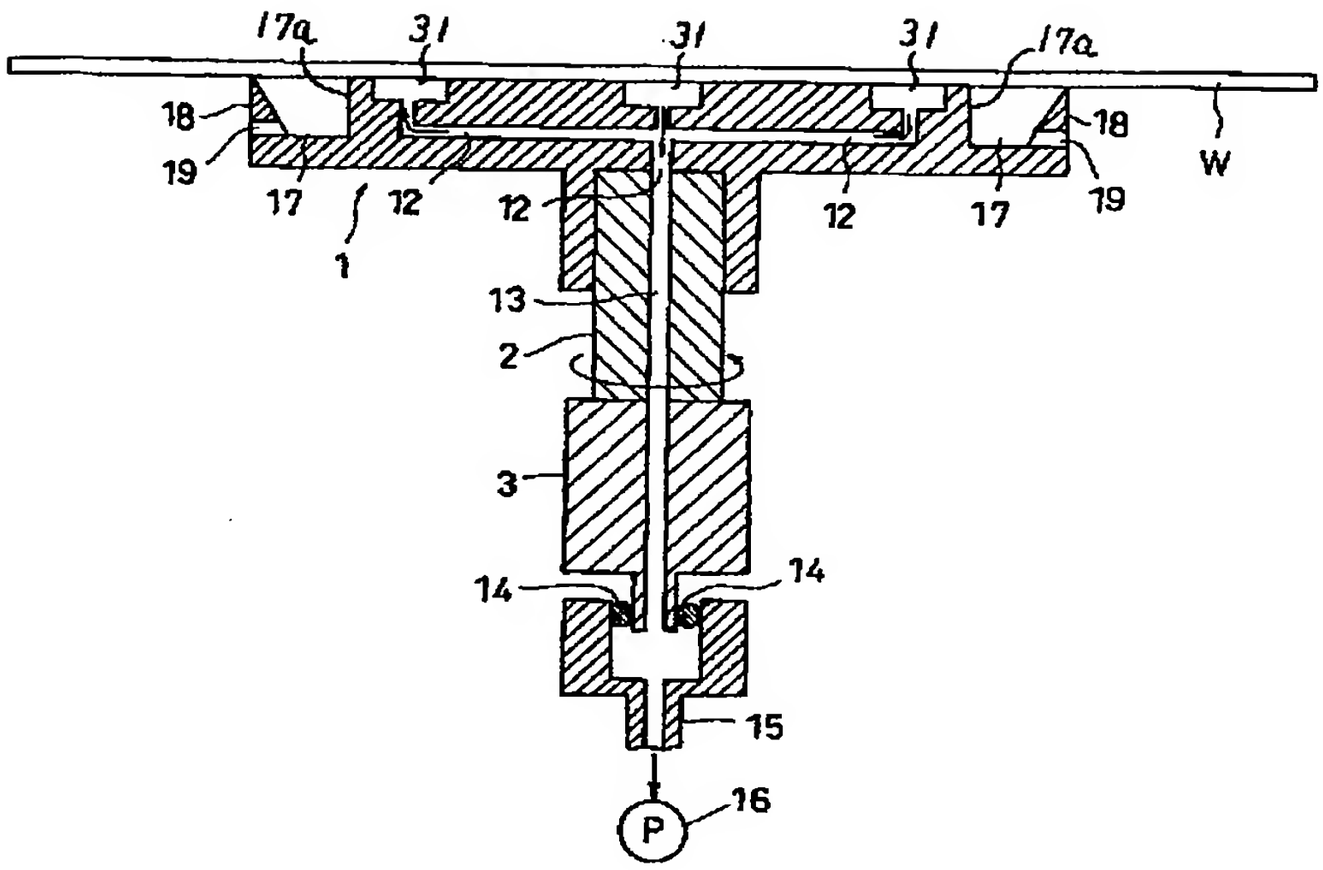
【図３】


(a)
W
D2
D2
D2
D2
D2
1
D1
1a
5b
8
10
5a
8
9
8
2
ガス
供給源
(b)
W
1
1a
5b
8
10
5a
8
8
2
11
ガス
供給源
(c)
W
1
1a
5b
8
5a
8
8
2

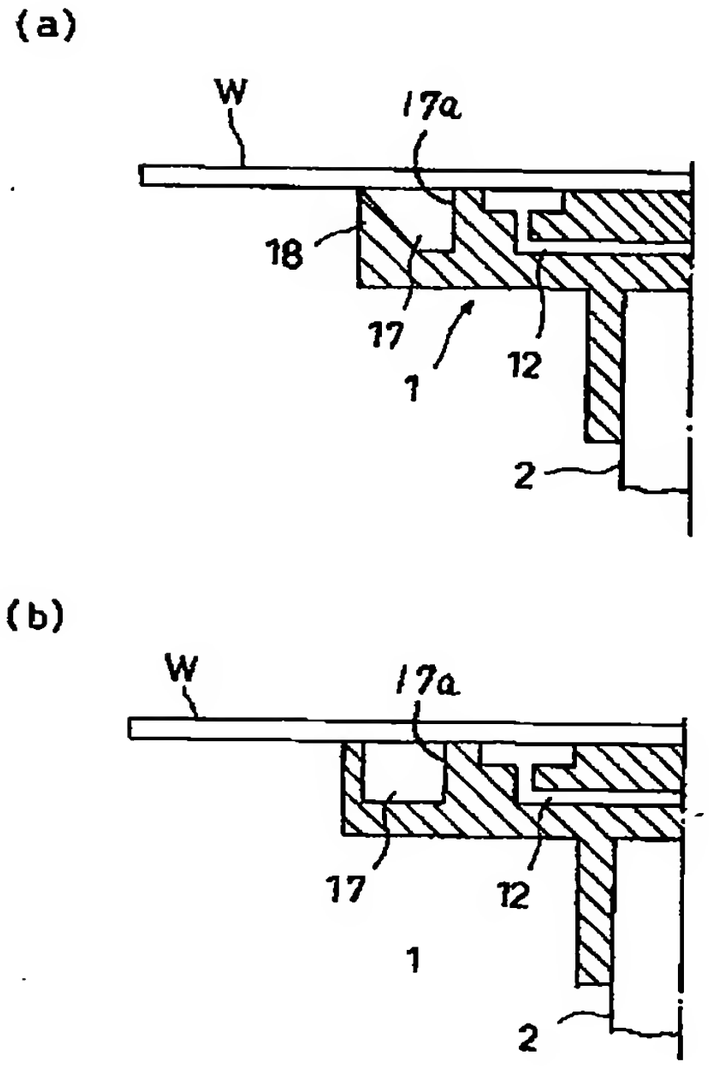
【図６】


W
1
20
2
5a

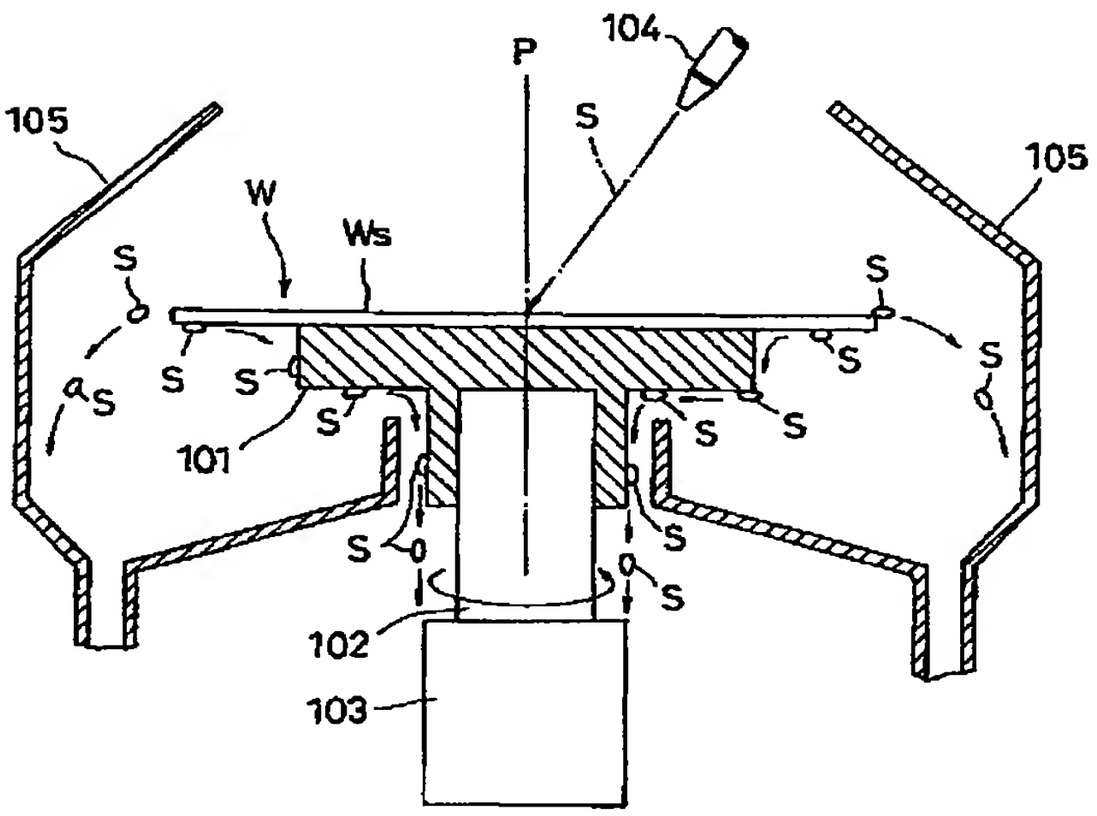
【図４】



【図５】



【図７】



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				５６９Ｃ	

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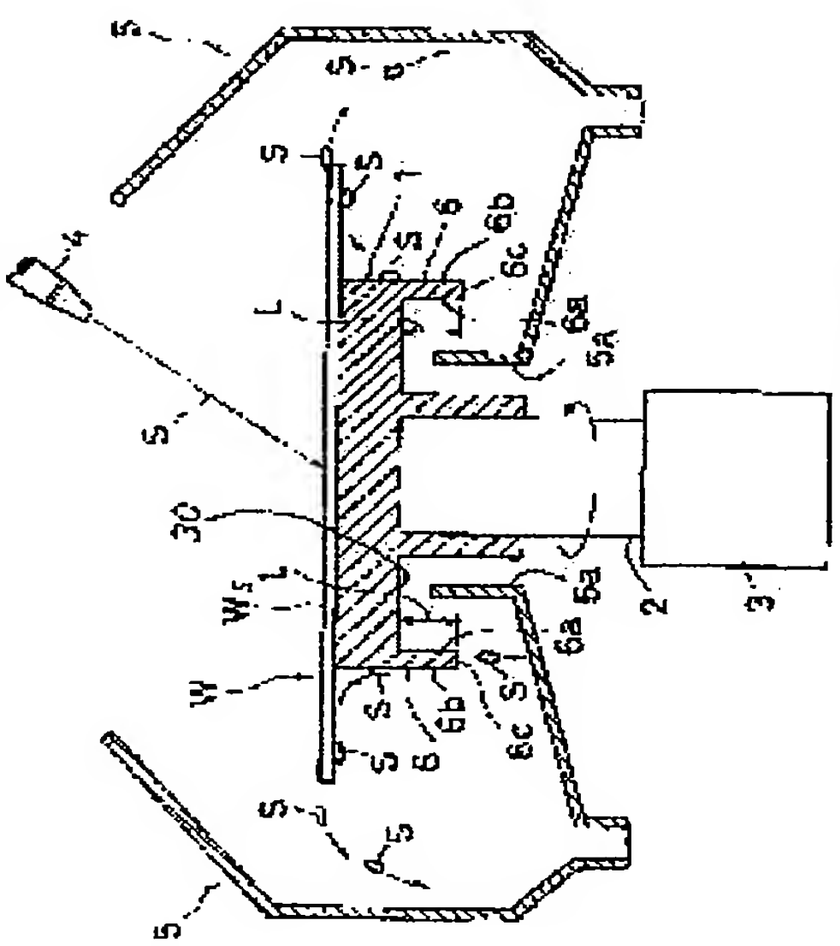
(72)Inventor : SASAKI TADASHI

54) DEVICE FOR TREATING SUBSTRATE

57)Abstract:
PROBLEM TO BE SOLVED: To provide a substrate treating device in which the infiltration of a treating liquid to a rotating/driving means for rotating a substrate is obstructed.
SOLUTION: A hanging edge 6 of the undersurface 30 of a spin chuck 1 is disposed on the outside of the internal cylinder part 5a of a scattering prevention cup 5 and extended to the downside of the upper edge of the part 5a. The treating liquid S flowing along the undersurface 30 of the spin chuck 1 drops from the lower edge 6c of the edge 6 and is discharged along the inner surface of the cup 5 for preventing scattering. As a result, the infiltration of the liquid S to a rotary shaft 2 and an electric motor 3 can be obstructed and the shaft 2 and the motor 3 can be prevented from being damaged by the liquid S.



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Date of request for examination]
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:LAIMS

Claim(s)]
Claim 1] The substrate processor carry out having arranged the invasion inhibition structure which is a ubstrate processor and prevents invasion of the processing liquid to said rotation driving means perform ubstrate processing by having a substrate maintenance means hold a substrate to a horizontal position, and the otation driving means which rotates a substrate in a horizontal plane by rotating said substrate maintenance neans, and supplying processing liquid to the processing side of a substrate, to said substrate maintenance neans as the description.
Claim 2] Said invasion inhibition structure is a substrate processor characterized by being the structure where he difference of elevation to which an inner circumference section side becomes [in / on a substrate rocessor according to claim 1 and / the inferior surface of tongue of said substrate maintenance means] high ver the perimeter of the inferior surface of tongue of a substrate maintenance means is prepared.
Claim 3] It is the substrate processor characterized by being the labyrinth structure constituted by the 2nd seal ection which said invasion inhibition structure countered the inferior surface of tongue of the 1st seal section /ith which the inferior surface of tongue by the side of said substrate maintenance means was equipped, and his 1st seal section in the substrate processor according to claim 1, and was prepared.
Claim 4] It is the substrate processor with which the clearance which said labyrinth structure has in the utermost periphery of said 1st seal section and 2nd seal section at least in a substrate processor according to laim 3 is characterized by being the magnitude which can avoid the inflow of said processing liquid by capillarity.

Claim 5] In a substrate processor according to claim 1 said substrate maintenance means It is the adsorption naintenance means which has the suction hole by which free passage connection was made in the source of uction through piping for suction on the top face of a substrate maintenance means, and carries out adsorption naintenance of the substrate. Said invasion inhibition structure The substrate processor with which it is nnularly arranged in the periphery of said suction hole on the top face of said adsorption maintenance means, nd opening of upper limit is characterized by equipping the top face of said adsorption maintenance means with he invasion inhibition slot blockaded by the adsorbed field of the substrate by which adsorption maintenance /as carried out.
Claim 6] It is the substrate processor characterized by being the annular projection configuration which carries ut line contact with the adsorbed field of a substrate in a substrate processor according to claim 5 in the eriphery edge of said invasion inhibition slot.
Claim 7] It is the substrate processor characterized by having the through tube to which said substrate naintenance means makes the outside ambient atmosphere of said substrate maintenance means open said nvasion inhibition slot for free passage in a substrate processor according to claim 5 or 6.
Claim 8] It is the substrate processor characterized by having the path into which said invasion inhibition tructure sends a gas toward the periphery section further in a substrate processor given in either of claim 1 to laims 7 from the center-of-rotation section of said substrate maintenance means.
Claim 9] It is the substrate processor characterized by said gas being inert gas in a substrate processor ccording to claim 8.

Translation done.]

DETAILED DESCRIPTION

Detailed Description of the Invention]

0001]

Field of the Invention] This invention relates to the rotating type substrate processor which performs substrate processing, starting the substrate processor which supplies processing liquid to a semi-conductor substrate, the glass substrate of a liquid crystal display, the glass substrate for photo masks, the substrate for optical disks (a substrate is only called hereafter), etc., and performs substrate processing, especially rotating a substrate.

0002]

Description of the Prior Art] As a conventional rotating type substrate processor, the substrate processor as shown in drawing 7 is known. The rotation drive of the disc-like vacuum type spin chuck 101 which carries out adsorption maintenance of the substrate W at a horizontal position is carried out with an electric motor 103 through the revolving shaft 102 connected with the base. By this rotation drive, the substrate W held at the spin chuck 101 rotates in a horizontal plane to the circumference of the center of rotation P. The nozzle 104 for turning and supplying processing liquid S (for example, the penetrant remover S) to the processing side Ws of substrate W is arranged above Substrate W. Moreover, the scattering prevention cup 105 which prevents that the processing liquid S mentioned above disperses is arranged in the perimeter of a spin chuck 101.

0003] By having an above-mentioned configuration, each processing (an above-mentioned case washing processing) is performed to the processing side Ws of Substrate W in connection with processing liquid S being supplied to the processing side Ws of Substrate W. Moreover, the processing liquid S which dispersed from the periphery section of Substrate W is discharged in accordance with the inside of the scattering prevention cup 105. Therefore, processing liquid S does not disperse outside the scattering prevention cup 105, and can prevent contamination by scattering of processing liquid S.

0004]

Problem(s) to be Solved by the Invention] However, in the case of the conventional substrate processor which has the above configurations, there are the following troubles. That is, it is the point of processing liquid S turning even to a rotation mechanical component called the revolving shaft 102 and electric motor 103 which are made rotating Substrate W, and doing damage to a rotation mechanical component.

0005] Since a centrifugal force is applied to Substrate W when Substrate W rotates at high speed, the processing liquid S supplied to Substrate W disperses outside, and is discharged in accordance with the inside of the scattering prevention cup 105. Therefore, it is rare for processing liquid S to turn to the center-of-rotation section of Substrate W, and for processing liquid S to attain to even rotation mechanical components, such as a revolving shaft 102 and an electric motor 103.

0006] However, when supplying processing liquid S where Substrate W is suspended, or rotating Substrate W at low speed, a centrifugal force is not applied to Substrate W. Therefore, the processing liquid S supplied to Substrate W depending on the surface state of Substrate W or the property of processing liquid S turns even to the rear face of Substrate W, or the rear face (namely, inferior surface of tongue) of a spin chuck 101. By surroundings lump of processing liquid S, processing liquid S will attain to even a revolving shaft 102, and damage will be done to a rotation mechanical component.

0007] Moreover, when Substrate W rotates at high speed, in case Substrate W is suspended, an ambient atmosphere (gas) including Myst of processing liquid S will be drawn in the center-of-rotation section, and damage will be done to a rotation mechanical component.

0008] until now, the dispersing processing liquid S can be pressed down -- as -- improving the scattering prevention cup 105 **** -- as -- its attention has been paid about the processing liquid S which disperses

utside. This time, this invention person etc. paid his attention about invasion prevention of the processing liquid which exerts damage even on a rotation mechanical component.

)009] This invention makes it a technical problem to be made in view of such a situation and to offer the ubstrate processor which prevents invasion of the processing liquid to the rotation driving means which rotates substrate.

)010]

Means for Solving the Problem] This invention takes the following configurations, in order to attain the above-ientioned technical problem. Namely, a substrate maintenance means by which invention according to claim 1 olds a substrate to a horizontal position, It has the rotation driving means which rotates a substrate in a orizontal plane by rotating said substrate maintenance means. It is characterized by arranging in said substrate aintenance means the invasion inhibition structure which is a substrate processor and prevents invasion of the rocessing liquid to said rotation driving means of performing substrate processing by supplying processing liquid o the processing side of a substrate.

)011] Moreover, invention according to claim 2 is characterized by said invasion inhibition structure being the tructure where the difference of elevation to which an inner circumference section side becomes high over the erimeter of the inferior surface of tongue of a substrate maintenance means is prepared on the inferior surface f tongue of said substrate maintenance means in a substrate processor according to claim 1.

)012] Moreover, invention according to claim 3 is characterized by said invasion inhibition structure being abyrinth structure constituted by the 1st seal section with which the inferior surface of tongue by the side of aid substrate maintenance means was equipped, and the 2nd seal section countered and prepared in the nferior surface of tongue of this 1st seal section in a substrate processor according to claim 1.

)013] Moreover, invention according to claim 4 is characterized by said labyrinth structure being the magnitude n which the clearance which is in the outermost periphery of said 1st seal section and 2nd seal section at least an avoid the inflow of said processing liquid by capillarity in a substrate processor according to claim 3.

)014] Invention according to claim 5 is set to a substrate processor according to claim 1. Moreover, said ubstrate maintenance means It is the adsorption maintenance means which has the suction hole by which free assage connection was made in the source of suction through piping for suction on the top face of a substrate naintenance means, and carries out adsorption maintenance of the substrate. Said invasion inhibition structure)n the top face of said adsorption maintenance means, it is annularly arranged in the periphery of said suction ole, and opening of upper limit is characterized by equipping the top face of said adsorption maintenance means vith the invasion inhibition slot blockaded by the adsorbed field of the substrate by which adsorption naintenance was carried out.

0015] Moreover, invention according to claim 6 is characterized by the periphery edge of said invasion inhibition lot being an annular projection configuration which carries out line contact with the adsorbed field of a ubstrate in a substrate processor according to claim 5.

0016] Moreover, invention according to claim 7 is characterized by equipping said substrate maintenance means vith the through tube which makes the outside ambient atmosphere of said substrate maintenance means open aid invasion inhibition slot for free passage in a substrate processor according to claim 5 or 6.

0017] Moreover, invention according to claim 8 is characterized by equipping said invasion inhibition structure vith the path which sends in a gas toward the periphery section from the center-of-rotation section of said ubstrate maintenance means further in a substrate processor given in either of claim 1 to claims 7.

0018] Moreover, invention according to claim 9 is characterized by said gas being inert gas in a substrate rocessor according to claim 8.

0019]

Function] An operation of invention according to claim 1 is explained. A rotation driving means rotates a ubstrate maintenance means and the substrate held at the horizontal position at this. In the rotation condition r idle state of a substrate, processing liquid is supplied to the processing side of a substrate. Moreover, rocessing of a substrate will be performed, without the processing liquid supplied to the processing side of a ubstrate by arranging in a substrate maintenance means the invasion inhibition structure which prevents nvasion of the processing liquid to a rotation driving means invading into a rotation driving means.

0020] According to gravity, it falls caudad, without the processing liquid which meets the rear face of a ubstrate and turned to the inferior surface of tongue of a substrate maintenance means flowing toward the nner circumference section, i.e., revolving shaft, side of a substrate maintenance means, since the difference of levation to which an inner circumference section side becomes high over the perimeter of the inferior surface

f tongue of a substrate maintenance means is prepared according to invention according to claim 2. Therefore, rocessing liquid does not invade into a rotation driving means, without [consequently] processing liquid ttaining to even the center-of-rotation section.

)021] According to invention according to claim 3, since invasion inhibition structure is labyrinth structure, ıvasion to the rotation driving means of the processing liquid which turned to the inferior surface of tongue of a ubstrate maintenance means will be prevented by labyrinth structure.

)022] According to invention according to claim 4, since the clearance in the outermost periphery of the 1st eal section and the 2nd seal section is the magnitude which can avoid the inflow of the processing liquid by apillarity, even if labyrinth structure trespasses upon the clearance which has processing liquid in the utermost periphery, generating of the capillarity which processing liquid permeates through narrow clearance is revented certainly. Therefore, invasion of the processing liquid to a rotation driving means will be prevented urther.

)023] Since according to invention according to claim 5 it was annularly arranged in the periphery of a suction ole on the top face of an adsorption maintenance means and opening of upper limit equips the top face of an dsorption maintenance means with the invasion inhibition slot blockaded by the adsorbed field of the substrate y which adsorption maintenance was carried out Even if processing liquid trespasses upon an invasion inhibition lot along the rear face of a substrate, it is interrupted by the wall by the side of invasion inhibition Mizouchi's enter of rotation, and processing liquid does not permeate in an adsorption maintenance means through a uction hole. Consequently, processing liquid does not invade into a rotation driving means.

)024] Since the periphery edge of an invasion inhibition slot is an annular projection configuration which carries ut line contact with the adsorbed field of a substrate according to invention according to claim 6, it is hard oming to generate the capillarity which the processing liquid which has flowed along the adsorbed field of a ubstrate permeates in the clearance between the adsorbed field of a substrate, and the periphery edge of an ıvasion inhibition slot which is an annular projection configuration. Therefore, processing liquid stops being able ɔ trespass upon an invasion inhibition slot easily, and invasion of the processing liquid to a rotation driving ıeans will be prevented further.

)025] According to invention according to claim 7, since the substrate maintenance means is equipped with the ırough tube which makes the outside ambient atmosphere of a substrate maintenance means open an invasion ıhibition slot for free passage, the pressure of the side of a substrate maintenance means and invasion ıhibition Mizouchi's pressure become the same. Therefore, since negative pressure which is drawn in the enter-of-rotation section at the time of carrying out suction adsorption of the substrate through a suction hole ; not applied to invasion inhibition Mizouchi, invasion inhibition Mizouchi's processing liquid stops being able to ıvade easily toward a center-of-rotation section side. Therefore, invasion of the processing liquid to a rotation riving means will be prevented further.

)026] Since the substrate maintenance means is equipped with the path which sends in a gas toward the eriphery section from the center-of-rotation section of a substrate maintenance means according to invention ccording to claim 8, even if processing liquid invades toward the center-of-rotation section, it is interrupted by ıe gas and processing liquid does not attain to even the center-of-rotation section. Consequently, processing quid does not invade into a rotation driving means.

)027] Since the gas sent in toward the periphery section from the center-of-rotation section of a substrate ıaintenance means is inert gas according to invention according to claim 9, neither processing liquid nor a ubstrate receives a bad influence with the sent-in gas.

)028]

Embodiment of the Invention] The [1st example] With reference to a drawing, the 1st example of this invention ; explained hereafter. Moreover, although an example (the 2nd example or subsequent ones is included) takes nd explains to an example the substrate processing (substrate washing) equipment which supplies a penetrant emover to a substrate and performs substrate processing, if it is the processing liquid usually used for rocessing of a substrate so that it may be illustrated by photoresist liquid, the developer, etc., it will not be mited especially. Drawing 1 is the outline sectional view showing the configuration of the 1st example quipment.

)029] The disc-like vacuum type spin chuck 1 to which a substrate processor holds Substrate W to a horizontal osition as shown in drawing 1 , The revolving shaft 2 connected with the base of this spin chuck 1, and the lectric motor 3 made to rotate this revolving shaft 2 to the circumference of an axial center, It has the nozzle 4 urrently arranged above Substrate W in order to turn and supply a penetrant remover S to the processing side

/s of Substrate W, and the scattering prevention cup 5 currently arranged in the perimeter of a spin chuck 1 in rder to prevent that processing liquid S disperses. The substrate W currently held at the horizontal position at spin chuck 1 and this spin chuck 1 in connection with a revolving shaft 2 rotating to the circumference of an xial center by the electric motor 3 rotates in a horizontal plane. Especially if a spin chuck 1 is a configuration quipped with the function of a substrate maintenance means to hold Substrate W to a horizontal position as lustrated by the spin chuck which set up the support pin which holds Substrate W to a horizontal position esides the above vacuum types to two or more places, it will not be limited. A spin chuck 1 is equivalent to the ubstrate maintenance means in this invention, and a revolving shaft 2 and an electric motor 3 are equivalent to he rotation driving means in this invention.

0030] Moreover, in order to prevent that the processing liquid S which has flowed along the inferior surface of ongue 30 of a spin chuck 1 invades into a revolving shaft 2 or an electric motor 3, as shown in drawing 1 , the nnular hanging-down edge 6 of die-length L is arranged in the inferior surface of tongue 30 of a spin chuck 1. his edge 6 is arranged outside container liner section 5a of the scattering prevention cup 5, and has extended ven below the upper limb of container liner section 5a. That is, margo-inferior 6c of an edge 6 is below the pper limb of container liner section 5a of the scattering prevention cup 5. Moreover, since there is a possibility hat the above-mentioned processing liquid S may invade [die-length L of an edge 6] even into the center-of-otation section across an edge 6 by less than 1mm, die-length L of an edge 6 has 1 desirablemm or more. An dge 6 is equivalent to the invasion inhibition structure in this invention, and the difference of elevation of nargo-inferior 6c of an edge 6 and the inferior surface of tongue 30 of a spin chuck 1 is equivalent to "the lifference of elevation to which an inner circumference section side becomes high over the perimeter of the nferior surface of tongue of a substrate maintenance means" in this invention.

0031] The 1st example equipment equipped with the above-mentioned configuration does the following perations so. That is, the processing liquid S which dispersed from the periphery section of Substrate W is lischarged by the centrifugal force in accordance with the inside of the scattering prevention cup 5. A urroundings lump and the processing liquid S which arrived at even the periphery edge of a spin chuck 1 further low down along with lateral-surface 6b of an edge 6 at the rear face of Substrate W. If it flows to margo-inferior 6c of an edge 6, processing liquid S will separate from an edge 6, and will fall as it is, or will flow along with nargo-inferior 6c of an edge 6 to the boundary part of margo-inferior 6c and medial-surface 6a. Since medial-urface 6a is a vertical plane as shown in drawing 1 , after the processing liquid S which has flowed to the oundary part of margo-inferior 6c and medial-surface 6a does not flow along with medial-surface 6a and stops t a boundary part, it falls. Since the edge 6 is arranged outside container liner section 5a of the scattering revention cup 5, the processing liquid S which fell by the edge 6 as well as the processing liquid S which lispersed from the periphery section of Substrate W is discharged in accordance with the inside of the cattering prevention cup 5 as it is. That is, since the difference of elevation to which an inner circumference ection side becomes high over the perimeter of the inferior surface of tongue 30 of a spin chuck 1 is prepared, he processing liquid S which turned to the inferior surface of tongue 30 of a spin chuck 1 along the rear face of Substrate W does not flow toward the inner circumference section 2, i.e., revolving shaft, side of a spin chuck 1, nd it falls caudad according to gravity.

0032] According to an above-mentioned operation, the processing liquid S which turned even to the inferior urface of tongue 30 of a spin chuck 1 does not attain to even the center-of-rotation section. Therefore, nvasion of a revolving shaft 2 or the processing liquid S to an electric motor 3 can be prevented. When upplying processing liquid S where Substrate W is suspended even if, or rotating Substrate W at a low speed, or when invasion of the processing liquid S which turned even to the inferior surface of tongue 30 of a spin chuck 1 an be prevented, and Substrate W stops and processing liquid S is drawn in the center-of-rotation section, nvasion of processing liquid S can be prevented. As mentioned above, damage is not done to rotation nechanical components (let a revolving shaft 2 and an electric motor 3 be "rotation mechanical components" collectively hereafter), such as a revolving shaft 2 or an electric motor 3.

0033] In addition, as shown in drawing 2 , deformation implementation of the 1st example equipment can be arried out. Although the edge 6 had extended with the above-mentioned 1st example equipment even below the pper limb of container liner section 5a of the scattering prevention cup 5, since above-mentioned processing iquid S falls by margo-inferior 6c of an edge 6 in any case, as shown in drawing 2 (a), margo-inferior 6c of an dge 6 may be a **** [upper limb / of container liner section 5a of the scattering prevention cup 5]. However, since there is a possibility that the processing liquid S which fell by margo-inferior 6c may be drawn in the enter-of-rotation section, may fall inside container liner section 5a of the scattering prevention cup 5, and may

amage a revolving shaft 2 and electric motor 3 grade with negative pressure etc., the configuration of an edge 6 s shown in drawing 1 is more more desirable than a configuration as shown in drawing 2 (a).

)034] Moreover, if it is the configuration of having the difference of elevation to which an inner circumference ection side becomes high over the perimeter of the inferior surface of tongue of a substrate maintenance eans on the inferior surface of tongue of a substrate maintenance means which is represented with the above-entioned 1st example equipment by the spin chuck 1 which holds Substrate W to a horizontal position although edial-surface 6a of an edge 6 was a vertical plane, you may be a slant face as shown, for example in drawing 2)).

)035] Moreover, as it is not necessary to necessarily arrange an edge 6 in the edge by the side of the periphery f a spin chuck 1 for example, and it is shown in drawing 2 (c), arranging in the center-of-rotation side approach f the inferior surface of tongue 30 of a spin chuck 1 etc. is not limited especially about the arrangement part of n edge 6. However, when it has a scattering prevention cup 5 like the 1st example equipment from the point hich prevents invasion to a rotation mechanical component, it is [direction] desirable and, as for the lateral urface of container liner section 5a of the scattering prevention cup 5, and medial-surface 6a of an edge 6, it is esirable to arrange at spacing which can avoid the inflow of processing liquid the edge 6 is arranged outside ontainer liner section 5a of the scattering prevention cup 5, and according to capillarity.

)036] Moreover, as shown in drawing 2 (d), a slot 7 may be annularly arranged in the inferior surface of tongue 0 of a spin chuck 1. In this case, the operation and effectiveness which it mentioned above since a slot 7 would orm the difference of elevation to which an inner circumference section side becomes high over the perimeter f the inferior surface of tongue 30 of the spin chuck 1 as a substrate maintenance means are acquired. In ddition, although the cross-section configuration made the slot 7 the hemicycle in drawing 2 (d), especially the onfiguration of a slot 7 should just be the slot which was not limited but was annularly arranged in the inferior urface of tongue 30 of a spin chuck 1.

)037] As mentioned above, if it is the configuration which equipped the inferior surface of tongue of a substrate aintenance means which is represented by the spin chuck 1 which holds Substrate W to a horizontal position ith the difference of elevation to which an inner circumference section side becomes high over the perimeter f the inferior surface of tongue of a substrate maintenance means, especially the configuration of the 1st xample equipment will not be limited.

)038] The [2nd example] It explains referring to a drawing about the 2nd example next. Drawing 3 (a) is the utline sectional view showing the configuration of the description part of the 2nd example equipment, and rawing 3 (b) and (c) are each outline sectional view showing the modification about the 2nd example. In addition, same sign is attached about the part which is common to the 1st example equipment, and illustration and xplanation of the part are omitted.

)039] The 2nd example equipment is equipped with a spin chuck 1, the revolving shaft 2, the electric motor 3, ne nozzle 4, and the scattering prevention cup 5 like the 1st example equipment. Explanation of the description art of the 2nd example equipment arranges in the inferior surface of tongue of a spin chuck 1 1st seal section a which is two or more concentric circular hanging-down edges, as shown in drawing 3 (a). 2nd seal section 5b hich is two or more concentric circular standup edges is arranged in container liner section 5a of the scattering revention cup 5 which counters the inferior surface of tongue of 1st seal section 1a. And these edges are lternately inserted in so that clearance 8 may be formed, respectively between 2nd seal section 5b of 1st seal ection 1a of a spin chuck 1, and container liner section 5a. That is, 1st seal section 1a and 2nd seal section 5b re a labyrinth (labyrinth). The seal of structure is constituted. The labyrinth structure constituted by 1st seal ection 1a and 2nd seal section 5b is equivalent to the invasion inhibition structure in this invention.

)040] Furthermore, the supply path 9 which sends in inert gas like nitrogen gas (N2) in the direction (from the enter-of-rotation section to namely, the periphery section the direction of the other side) of the arrow head in rawing 3 (a) is arranged in container liner section 5a. The center-of-rotation side (inside) of this supply path 9, nd N2 The source 10 of gas supply which supplies inert gas [like] is opened for free passage through the egulator which omits illustration. Moreover, as shown in drawing 3 (a), the supply path 9 branches to two or ore, and is opened for free passage by clearance 8. Moreover, width of face D1 of the clearance 8 in the utermost periphery It is formed in the magnitude which can avoid the inflow of the processing liquid by apillarity. Width of face D1 of this clearance 8 For example, it is set as 5mm. This clearance 8 and the supply ath 9 are equivalent to "the path which sends in a gas toward the periphery section from the center-of-otation section of a substrate maintenance means" in this invention.

)041] The 2nd example equipment equipped with the above-mentioned configuration does the following

perations so. That is, before supplying processing liquid S to the processing side Ws of Substrate W from a ozzle 4, inert gas is beforehand sent into the supply path 9 toward the direction of the arrow head in drawing 3 a) from the source 10 of gas supply. Clearance 8 is filled up with the gas sent into the supply path 9. After filling p with gas, supply of processing liquid S is started from a nozzle 4.

0042] The processing liquid S which dispersed from the periphery section of Substrate W is discharged by the entrifugal force as well as the 1st example in accordance with the inside of the scattering prevention cup 5. A urroundings lump and the processing liquid S which turned even to the inferior surface of tongue of a spin huck 1 further are prevented at the rear face of Substrate W by the labyrinth structure constituted by 1st seal ection 1a and 2nd seal section 5b, without invading to a rotation mechanical component.

0043] Moreover, width of face D1 of the clearance 8 which is in the outermost periphery even if processing quid S is drawn in the clearance 8 in the outermost periphery by negative pressure etc. Since it is the nagnitude which can avoid the inflow of the processing liquid by capillarity, generating of the capillarity which rocessing liquid permeates through narrow clearance can be prevented certainly. Therefore, invasion of the rocessing liquid S to a rotation mechanical component can be prevented more.

0044] Moreover, since it fills up in clearance 8 while inert gas is sent in toward the direction of the arrow head n drawing 3 (a), even if an ambient atmosphere (gas) including Myst of processing liquid S and processing liquid ; invades toward the center-of-rotation section, it will be interrupted by inert gas and even the center-of-otation section will not be attained to. Moreover, since the gas supplied in clearance 8 is inert gas, it does not ave a bad influence on processing liquid S and Substrate W.

0045] In addition, as shown in drawing 3 (b) and (c), deformation implementation of the 2nd example equipment an be carried out. Although inert gas was sent into clearance 8 from the source 10 of gas supply through the upply path 9 with the above-mentioned 2nd example equipment, as shown in drawing 3 (b), you may be the onfiguration that inert gas is directly sent into clearance 8 from the source 10 of gas supply. In addition, in rder to prevent that inert gas is sent into the clearance 8 in the innermost part at a center-of-rotation side, he rotation seal 11 is arranged. Although a part of inert gas supplied to clearance 8 may leak to a center-of-otation side with the above-mentioned 2nd example equipment, since inert gas flows the inside of clearance 8 oward a periphery side by having a configuration as shown in drawing 3 (b) from a center-of-rotation side, nvasion of processing liquid S can be prevented further.

0046] Moreover, width of face D1 of the clearance 8 which is in the outermost periphery side with the above-nentioned 2nd example equipment Although considered as the magnitude which can avoid the inflow of the rocessing liquid by capillarity It is the width of face D1 of the clearance 8 which is in the outermost periphery ide as it is not limited especially about the size of clearance 8, for example, is shown in drawing 3 (c). Width of ace D2 of the clearance between inside May be the same size and Width of face D1 of the clearance 8 in the utermost periphery You may not be the magnitude which can avoid the inflow of the processing liquid by apillarity. However, width of face D1 of the clearance 8 which is in the outermost periphery side in the point vhich make hard to generate capillarity in which processing liquid permeates a center-of-rotation side from the utermost periphery side It is more desirable to consider as the magnitude which can avoid the inflow of the rocessing liquid by capillarity.

0047] Moreover, although inert gas was supplied to clearance 8 with the above-mentioned 2nd example equipment, the configuration of only labyrinth structure as not necessarily sent in inert gas etc. and shown in drawing 3 (c) may be used. However, in the point that invasion of an ambient atmosphere (gas) including Myst of rocessing liquid S and processing liquid S is prevented more, the configuration as shown in drawing 3 (a) is nore more desirable than a configuration as shown in drawing 3 (c) by interrupting with inert gas.

0048] With the above-mentioned 2nd example equipment, it is N2 as inert gas. Although mentioned to the example, especially about the class of inert gas used, it is not limited so that it may be illustrated by Ar, helium, etc. Moreover, clearance 8 and the supply path 9 may be made to send in and fill up with gases other than inert gas, and if it does not have a bad influence on processing liquid S and Substrate W, about the class of gas used, t is not especially limited, so that it may be illustrated by air etc.

0049] The [3rd example] It explains referring to a drawing about the 3rd example next. Drawing 4 is the outline sectional view showing the configuration of the description part of the 3rd example equipment. In addition, a same sign is attached about the part which is common to the 1st and 2nd example equipment, and illustration and explanation of the part are omitted. Moreover, in the 3rd example, the spin chuck 1 is built by the vacuum Formula which carries out adsorption maintenance of the substrate W, and is equivalent to the adsorption maintenance means in this invention.

)050] The 3rd example equipment is equipped with a spin chuck 1, the revolving shaft 2, the electric motor 3, ıe nozzle 4, and the scattering prevention cup 5 like the 1st and 2nd example equipment. If the spin chuck 1 of vacuum type is described in more detail, the suction hole 31 for carrying out vacuum adsorption of the ubstrate W, and holding to a horizontal position is formed in the top face of a spin chuck 1, and the piping 12 for acuums by which free passage connection is made is arranged by the suction hole 31 in the spin chuck 1. hese piping 12 is summarized as hollow piping 12 of one in the center-of-rotation section of a spin chuck 1. he revolving shaft 2 and the electric motor 3 have become in midair, and each centrum 13 of a revolving shaft and an electric motor 3 is opened for free passage mutually. One side of this centrum 13 is open for free assage for the hollow piping 12, and another side is opened for free passage by the vacuum pump 16 through ıe vacuum piping 15 equipped with the vacuum seal 14. Piping 12, the centrum 13, and the vacuum piping 15 for acuums are equivalent to piping for suction in this invention, and a vacuum pump 16 is equivalent to the source f suction in this invention.

)051] If a vacuum pump 16 is operated, adsorption maintenance of the substrate W will be carried out by accum pressure at a spin chuck 1 at a horizontal position. Although the 1st and 2nd example explained the case here processing liquid S turned even to the inferior surface of tongue of a spin chuck 1, by this vaccum ressure, negative pressure is applied to the periphery section from the center-of-rotation section, and some rocessing liquid S trespasses upon the clearance between the rear face of Substrate W, and the top face of a pin chuck 1. With this negative pressure, the processing liquid S which invaded will permeate in a spin chuck 1 om the suction hole 31, will invade into the centrum 13 of a rotation mechanical component further, and will do amage from the rotation drive circles section. Then, when processing liquid S turns to the rear face of ubstrate W, in order to prevent invasion in the rotation drive circles section, with the 3rd example equipment, it as the following description parts.

)052] That is, the slot 17 is annularly arranged in the top-face periphery section of a spin chuck 1. This slot 17 ; further arranged in the periphery side rather than the suction hole 31 currently most arranged in the periphery ection, as shown in drawing 4 . And as shown in drawing 4 , opening of the upper limit of a slot 17 is blockaded y the adsorbed field of the substrate W by which adsorption maintenance was carried out, i.e., the rear face of ubstrate W, at the spin chuck 1. Moreover, the periphery edge of a slot 17 constitutes the height 18 of the nnular projection configuration which carries out line contact with the rear face of Substrate W, as shown in rawing 4 . Moreover, the periphery ambient atmosphere and slot 17 of a spin chuck 1 are opened for free assage by arranging in a height 18 the through tube 19 which is open for free passage in the outside ambient tmosphere of a spin chuck 1. A slot 17 is equivalent to the invasion inhibition slot in this invention, a through ube 19 is equivalent to the through tube in this invention, and a slot 17, a height 18, and a through tube 19 are quivalent to the invasion inhibition structure in this invention.

)053] The 3rd example equipment equipped with the above-mentioned configuration does the following perations so. That is, where it operated the vacuum pump 16 and vacuum adsorption of the substrate W is arried out, if supply of processing liquid S is started from a nozzle 4, as mentioned above, the negative pressure y vaccum pressure will be applied to the periphery section from the center-of-rotation section, and some rocessing liquid S will turn to the rear face of Substrate W. Since line contact of the height 18 is carried out at he rear face of Substrate W, it is hard coming to generate capillarity like [when field contact is carried out]. herefore, processing liquid S stops being able to trespass upon a slot 17 easily, and can prevent invasion to a otation mechanical component.

)054] Moreover, since it is interrupted by wall 17a by the side of the center of rotation in a slot 17 even if it ıvades into the processing liquid S fang furrow 17, it can prevent that processing liquid S stops being able to ıvade easily toward a center-of-rotation section side, consequently processing liquid S permeates in a spin huck 1 from the suction hole 31, and invades into the centrum 13 of a rotation mechanical component further. herefore, processing liquid can prevent invading into a rotation mechanical component and damaging the otation drive circles section. Furthermore, since the outside ambient atmosphere and slot 17 of a spin chuck 1 re opened for free passage by arranging a through tube 19, even if the inside of a slot 17 becomes atmospheric ressure and requires the negative pressure by vaccum pressure for the periphery section from the center-of-otation section, it is in a slot 17. Therefore, even if it invades into the processing liquid S fang furrow 17, rocessing liquid S stops being able to permeate easily due to the inside of a spin chuck 1 toward a center-of-otation section side, consequently invasion to a rotation mechanical component can be prevented more.

)055] In addition, as shown in drawing 5 , deformation implementation of the 3rd example equipment can be arried out. In the 3rd above-mentioned example, although the through tube 19 was arranged in the height 18, as

ng as a through tube 19 carries out even making a slot 17 open for free passage with the outside ambient tmosphere of a spin chuck 1, it may be prepared in any location in the spin chuck 1, for example, may be repared in the base of a slot 17. Moreover, you may be the configuration which does not arrange the through ube 19 as shown in drawing 5 (a). However, since there is a possibility that the processing liquid S which ivaded in the slot 17 may be drawn in the center-of-rotation section by the negative pressure by vaccum ressure when there is no through tube 19, the configuration as shown in drawing 4 is more more desirable than ne configuration which does not arrange the through tube 19 as shown in drawing 5 (a).

0056] Moreover, although the periphery edge of a slot 17 constituted the annular height 18 which carries out ne contact with the rear face of Substrate W from above-mentioned 3rd example equipment, as shown, for xample in drawing 5 (b), the periphery edge of a slot 17 may constitute the annular field which carries out field ontact with the rear face of Substrate W. However, since it is easy to generate the capillarity which the rocessing liquid S which flowed into the rear face of Substrate W permeates in the inside of a height 18 in field ontact, the configuration as shown in drawing 4 is more more desirable than a configuration as shown in drawing (b).

0057] [Modification] This invention is not restricted to the above-mentioned operation gestalt, and deformation nplementation can be carried out as follows.

0058] That is, with the 1st and 2nd example equipment mentioned above, although it was the case where ivasion inhibition structure was arranged in the inferior surface of tongue of a substrate maintenance means hich is represented by the spin chuck 1, and invasion inhibition structure was arranged in the top face of a ubstrate maintenance means with the 3rd example equipment, invasion inhibition structure may be arranged in ddition to the top face or inferior surface of tongue of a substrate maintenance means. For example, as shown n drawing 6 , while arranging a height 20 in the pars basilaris ossis occipitalis of a spin chuck 1, the height 20 ay be arranged outside container liner section 5a of the scattering prevention cup 5. The processing liquid S hich turns along the inferior surface of tongue of a spin chuck 1 flows in along the side face of a spin chuck 1, nd is discharged in the scattering prevention cup 5 along with a height 20. Thus, if the invasion inhibition tructure which prevents invasion of the processing liquid to a rotation mechanical component to a substrate rocessor is arranged, it will be limited neither about an arrangement part nor especially a configuration.

0059] The modification which combines suitably each example mentioned above and a modification is also onsidered. For example, such a path may be combined with the 3rd example although the path which sends a as into clearance 8 and the supply path 9 was arranged in the 2nd example. That is, a slot 17 may be made to nake free passage connection of clearance 8 or the supply path 9, a gas may be sent into a slot 17 through learance 8 or the supply path 9, and you may make it filled up with a gas in a slot 17.

0060]

Effect of the Invention] Substrate processing can be performed in the rotation condition or idle state of a ubstrate, without the processing liquid supplied to the processing side of a substrate invading into a rotation lriving means, since the invasion inhibition structure which prevents invasion of the processing liquid to a otation driving means is arranged in a substrate maintenance means according to the substrate processor oncerning invention of claim 1 as explained in full detail above.

0061] Invasion of the processing liquid to a rotation driving means can be prevented without processing liquid ttaining to even the center-of-rotation section, since the difference of elevation to which an inner ircumference section side becomes high over the perimeter of the inferior surface of tongue of a substrate naintenance means is prepared according to the substrate processor concerning invention of claim 2.

0062] According to the substrate processor concerning invention of claim 3, since invasion inhibition structure s labyrinth structure, invasion to the rotation driving means of the processing liquid which turned to the inferior urface of tongue of a substrate maintenance means can be prevented according to labyrinth structure.

0063] Since labyrinth structure is the magnitude in which the clearance in the outermost periphery of the 1st eal section and the 2nd seal section can avoid the inflow of the processing liquid by capillarity according to the substrate processor concerning invention of claim 4, generating of the capillarity which processing liquid ermeates through narrow clearance can be prevented certainly, and invasion of the processing liquid to a otation driving means can be prevented further.

0064] According to the substrate processor concerning invention of claim 5, on the top face of an adsorption naintenance means, it is annularly arranged in the periphery of a suction hole. Since opening of upper limit equips the top face of an adsorption maintenance means with the invasion inhibition slot blockaded by the dsorbed field of the substrate by which adsorption maintenance was carried out Invasion of the processing

quid to a rotation driving means can be prevented without the processing liquid which has flowed along the rear ıce of a substrate permeating in an adsorption maintenance means through a suction hole.
)065] Since the periphery edge of an invasion inhibition slot is an annular projection configuration which carries ut line contact with the adsorbed field of a substrate according to the substrate processor concerning ıvention of claim 6 It is hard coming to generate the capillarity which the processing liquid which has flowed long the adsorbed field of a substrate permeates in the clearance between the adsorbed field of a substrate, nd the periphery edge of an invasion inhibition slot which is an annular projection configuration, and invasion of ıe processing liquid to a rotation driving means can be prevented further.
)066] According to the substrate processor concerning invention of claim 7, since it has the through tube which ıakes the outside ambient atmosphere of a substrate maintenance means open an invasion inhibition slot for ee passage, invasion inhibition Mizouchi's processing liquid stops being able to invade easily toward a center-f-rotation section side, and a substrate maintenance means can prevent further invasion of the processing quid to a rotation driving means.
)067] Invasion of the processing liquid to a rotation driving means can be prevented without processing liquid ttaining to even the center-of-rotation section, since the substrate maintenance means is equipped with the ath which sends in a gas toward the periphery section from the center-of-rotation section of a substrate ıaintenance means according to the substrate processor concerning invention of claim 8.
)068] Since the gas sent in toward the periphery section from the center-of-rotation section of a substrate ıaintenance means is inert gas according to the substrate processor concerning invention of claim 9, it does ot have a bad influence on processing liquid or a substrate.

[ranslation done.]

NOTICES *

ESCRIPTION OF DRAWINGS

Brief Description of the Drawings]
Drawing 1] It is the outline sectional view showing the configuration of the 1st example equipment.
Drawing 2] (a) – (d) is each outline sectional view showing the modification about the 1st example.
Drawing 3] The outline sectional view in which (a) shows the configuration of the description part of the 2nd example equipment, (b), and (c) are each outline sectional view showing the modification about the 2nd example.
Drawing 4] It is the outline sectional view showing the configuration of the description part of the 3rd example equipment.
Drawing 5] (a) And (b) is each outline sectional view showing the modification about the 3rd example.
Drawing 6] It is each outline sectional view of the substrate processor concerning the further modification.
Drawing 7] It is the outline sectional view showing the configuration of the conventional substrate processor.
Description of Notations]
— Spin Chuck
a — The 1st seal section
— Revolving Shaft
— Electric Motor
— Scattering Prevention Cup
a — Container liner section
b — The 2nd seal section
— Edge
— Clearance
— Supply Path
0 — Source of Gas Supply
2 — Piping
3 — Centrum
5 — Vacuum Pump
7 — Slot
8 — Height
9 — Through Tube
0 — Inferior Surface of Tongue
1 — Adsorption Hole
— Substrate
s — Processing side
— Processing liquid

Translation done.]